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CASE STUDY

Remix the Medieval Manuscript: Experiments with Digital Infrastructure

By Michelle R. Warren, Bay Lauris ByrneSim, Laura Braunstein, with collaborators (in alphabetical order): Monica Erives, Logan Henderson, Deborah Howe, Divya Kalidindi, Scott Millsbaugh, Benjamin Patrick, Emily Ulrich, Qingyu Wang, and Jennifer Zhong
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Digital manuscripts are part of the infrastructure of medieval studies in the twenty-first century. Given this fact of contemporary scholarship, we need nuanced and detailed understandings of how digital ecologies are shaping our understanding of the manuscripts, forging new epistemologies for historical research. As people invent new tools and interfaces—and earlier ones become obsolete—the very nature of our historical information changes. Every time something is reformatted, some parts are preserved and others are left out, even erased from the record. These effects have always been part of cultural preservation and archiving, but they are compounded in digital environments due to the precarity of both the record itself and our access to it. And while medievalists are accustomed to asking questions about the many factors that influence the form and content of material records, they are only beginning to bring such questions to digital contexts. *Remix the Manuscript: A Chronicle of Digital Experiments* is a collaborative research project that takes up this challenge.¹ It brings together academics, librarians, technologists, conservators, and students to study the many permutations of a single manuscript—a fifteenth-century Middle English prose chronicle of Great Britain, commonly referred to as the “Prose *Brut*.”

Our project raises fundamental questions about the digital research environment. How is today’s code configuring tomorrow’s historical knowledge? How do digital technologies affect our access



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to and understanding of material culture? By investigating these broad questions through the example of one manuscript, we define a limited yet infinitely expandable dataset. In this way, we try to ensure that team members, whose time and capability to participate varies, can complete projects while not sacrificing epistemological concerns to expediency. We seek the flexibility to adopt new tools as they emerge, change course in response to new problems, and abandon lines of inquiry as team members change. Our approach is therefore grounded in sampling and prototyping. We aim to develop insight into how digital culture is reshaping medieval manuscript studies, while remaining connected to the unique sensualities of historic books.² In the long run, we hope that this research will identify some of the distinct affordances of digital forms. In this project, *remix* is a method, a theory, and an aesthetic philosophy.

In terms of method, we are pursuing “close readings” of digital infrastructure. Engaging with the field of critical infrastructure studies, we take a capacious view of what counts as infrastructure—from hardware, to interfaces, to metadata, to image files.³ In this way, we push ourselves to notice the many ways in which our research environment affects our research questions and outcomes. Since many things in this environment are designed to efface themselves, like the code the runs under an interface, we need continual effort to challenge our assumptions about how meaning is created. Of course, a broad definition of infrastructure does not mean that each element has the same scale or type of impact. A digital repository is not the same as an imaging technology; content management and operating systems do distinct types of work. In any given instance, however, we endeavor to account for as many dimensions as we can manage, shifting the spotlight to illuminate the different methods and interests of our team members as we go.

In terms of theory, we approach digital infrastructures as epistemological performances. This orientation derives from Michelle Warren’s previous work in philology, where she has considered the formative powers of metaphor: the way we talk about our objects of study frames the way that we conduct research. ⁴ In the case of digital medieval manuscripts, the dominant metaphor has been the *surrogate*. The concept of surrogacy, however, implies a kind of substitution that users are invited to judge either adequate or inadequate. A digital manuscript, however, functions more like an *avatar*—a specifically digital representation that operates in an independent virtual world while remaining tied to its material inspiration. While

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medievalists have used the term as a variation on surrogate, the specificity of the metaphor affects our conceptualization of manuscripts.⁵ An avatar has its own agency to create meaning in a space that the material object cannot inhabit; those new meanings can in turn spill back over into the material world that the avatar cannot inhabit. As Ségolène Tarte has put it, “digital avatars are interpretative.”⁶ Tarte delineates a crucial distinction between seeing and knowing, pulling apart the interpretative processes involved in an avatar’s encoding and relationships with the real world.⁷ Thus while some may consider avatars a form of content rather than infrastructure, they can be both. This dual status illustrates the ways in which digital forms collapse distinctions between ontology and epistemology.

Finally, in relation to aesthetics, we take seriously the multimedia dimensions of remix cultures in music, visual arts, photography, and other media. We have partnered from the beginning with an artist, [Benjamin Patrick](#), who works at the interstices of the digital and the material, remixing images in digital formats and then printing them in three dimensions at variable scales. His rematerializations of digital avatars include printing on vellum and handcrafting inspired by medieval practices (such as working with gold leaf). Our collaborations in the digital arts test common boundaries between research and creative performance. They also draw our attention toward the aesthetics of data visualization tools and interfaces. Design elements, such as color and page layout, act not only as conduits for knowledge but also as active partners in the perception of knowledge. In all these ways, *Remix the Manuscript* attends to continuities between manuscript page and hardware screen while highlighting the specific affordances of each instance of mediation.

The Data

The manuscript in question is a copy of the Middle English Prose *Brut* chronicle, one of the most widely disseminated histories of Great Britain in the Middle Ages. The narrative begins with the legendary settlement of the island after the Trojan War and continues into the fifteenth century. Particularly famous episodes include the story of King Lear and the reign of King Arthur. Today, nearly two hundred copies survive in a wide variety of versions and states of completion. Their textual relations have been analyzed by Lister Matheson, who organized groupings according to shared traits such as end dates, idiosyncratic phrasing, and particular historical anecdotes.⁸

The copy that we are studying was purchased by Dartmouth

College in 2006, where it is now catalogued as [Rauner Codex MS 003183](#). This manuscript had been continuously in private hands since its creation and had never been examined for scholarly purposes. Shortly after its arrival at Dartmouth, Elizabeth Bryan determined that the text represents a unique, idiosyncratic version of the *Brut* narrative.⁹ In other words, it is not a direct copy of any other known exemplar, nor is it part of one of the textual groups described by Matheson. In addition, it includes extensive marginal annotations from medieval and early modern readers.¹⁰ These discoveries made the manuscript especially valuable for the study of textual transmission, scribal culture, book production, and reading practices. The creation of the digital manuscript in 2009 made it possible for more people to study these issues.¹¹ Almost immediately, though, we found that the architectures of digital access presented research questions that were just as urgent as those about textual transmission and the manuscript “itself.”¹² So began *Remix*—first as a vague idea in a conversation with Scott Millspaugh (an instructional designer at Dartmouth at the time) and then a proposal for [seed funding](#) from Dartmouth in January 2015.

The *Brut* corpus receives its fair share of attention from scholars.¹³ The corpus is therefore sufficiently well documented enough for us to ask meaningful questions about content and material histories, which should be of interest to a range of medievalists. Our broader aim, however, has little to do with the specificities of the *Brut* corpus or the Dartmouth *Brut* manuscript. Instead, our research questions address the tools, platforms, and other types of infrastructure that make it possible to use a digital avatar of a medieval manuscript as a primary source. As we investigate all the ways that we can “play” with the avatar, we analyze the processes that generate, visualize, and interpret data. We treat the avatar as both an independent entity and as a performance of relationship with the material. In this way, we query the paradigmatic distinction between documents and databases.

The Practice

Remix the Manuscript is less about a particular historical document than about the tools we have for engaging that document in digital environments. We are equally interested in how those environments themselves generate their own research questions. Our project is thus distinct from many other digital endeavors in medieval studies because we have not set out to create a particular tool, repository, object, or resource. Instead, we are interested in how those products function as elements of research infrastructure and thereby mediate our understanding of

the past. This venture brings some risks, as the legibility of “digital humanities” (DH) is still very much tied to “building things.” It is noteworthy, for example, that we presented *Remix* at the Medieval Academy of America sessions that led to the recent compendium *The Digital Middle Ages* published by *Speculum*—and yet the editors determined that our project did not fit the parameters for illustrating accomplishments in the field because we were not answering a discrete historical question.¹⁴

Our project will ultimately include many different types of digital and material outputs, from textual analysis to artistic collage. Already, many decisions that seemed like “background” turned out to be research projects in their own right—from the basic display of image files, to the selection of web publishing platforms, to the ways in which institutional infrastructure creates (or inhibits) possibilities for scholarly collaboration. This process is our primary target of inquiry. In this sense, we are building on the prototyping methodology of Alan Galey and Stan Ruecker: “It makes a difference whether we think in terms of processes or of products.”¹⁵ When the focus shifts to processes, every element of design becomes not only meaningful but also part of an argument: “Failing to recognize design as a hermeneutic process means failing to understand how our inherited cultural record actually works. Yet the other side of the coin is the opportunity to understand how our own designs are part of a longer continuum than project cycles normally prompt us to think about.”¹⁶ Tellingly for *Remix*, Galey and Ruecker cite medievalist Bernard Cerquiglini to reinforce the significance of mediation: “every edition is a theory.”¹⁷ Through comparative analysis of both data and tools, we seek to pinpoint more precisely the differences between a theory and a description. In this approach, the data model is also a research question.

The concept of *remix* provides a shorthand characterization of this recursive practice. *Remix* encompasses the dynamic potential of data, the ongoing mediation of history, and the generative environment of the digital. It tethers us to repetition (*re*) and to inherited forms (things already available to be thrown into the *mix*). *Remix* riffs on Mark Amerika’s remixthebook.com, an interactive platform where artists, philosophers, and technologists played with Amerika’s source material to “remix” the very idea of the book. One of these contributions, Whittney Trettien’s [Remixing History](#), foregrounds the kind of linguistic lineage that connects digital manuscripts to digital media studies. Trettien calls attention to the first use of *remix*, in Thomas Lodge’s 1614 English translation of Seneca’s Latin *Epistle LXXI* ([Oxford English Dictionary](#)). The word is itself something of a remix of Latin—“an

Anglicization of *remiscebitur*, invented to evoke the scholarly elitism of Latinate constructions.”¹⁸ The tantalizingly distant date of 1614 makes a medievalist wonder about further prehistories. And indeed, the [Middle English Dictionary](#) reports that “mix” is basically dirty stuff (filth, dung, foul, wicked, vile).¹⁹ The OED deems this medieval mess “obsolete,” although it’s wholly contemporary for our fifteenth century manuscript (which in fact reached us full of mix in the form of dirt and cat hair).²⁰ Another “now rare” meaning of *mix* is also highly pertinent: “the accidental running together of unconnected portions of text” (OED).²¹ This *remixing* is a specific artifact of analog printing, yet also happens in digital text environments when representational instructions get “mixed up.” In a research environment dedicated to mixology, such failure moments are both data points and (potentially) aesthetic accomplishments.

Our remix practice enables us to move at variable speeds and reshuffle our priorities according to circumstances, much like a dance remix is a new version of a song generated for a specific social environment. Because we don’t necessarily aim for comprehensive results, we can do more experiments more often. If our comparisons are meaningful, we’ll be able to analyze the relative effects of tools on the production and representation of the data. These analyses might become useful resources for other project teams that need to choose a tool to pursue their particular historical question. By taking a critical approach to choosing tools and platforms, we can build a broader collective understanding of how that choice shapes outcomes and how some tools may be better suited for certain kinds of questions.²² It’s too early to know if we will reach this kind of impact, but this is our ambition.

We are working to turn common research “problems”—team turnover, limited resources of time and money—into assets. To do so means rethinking both the nature of the “project” and the goals of research itself.²³ We launched, for example, with a faculty grant from Dartmouth for travel, workshops, and materials (2015-17).

The [evolving team](#) has included campus librarians, technologists, students, alumni, and acquaintances. Student researchers are paid through existing campus programs; salaried professional colleagues are absorbing project time into existing job descriptions (including a margin of volunteer labor); others choose to participate without monetary compensation because their contributions serve their own professional goals. We design scaffolded research modules so that each member creates tangible scholarly outcomes, whether they participate for three months or three years. Each module is itself scalable, so that the team can adapt to unexpected complexities and still meet a firm deadline.

Each outcome, and each detour, contributes to future projects. As we remix the team, we remix the project priorities according to members' skills and interests. By conducting digital research as a form of digital pedagogy, the project provides and receives services in a cyclical knowledge economy. In this way, we engage in an ongoing [critical analysis of collaboration](#) and contribute to the normalization of multi-authorship in the humanities.²⁴

The Experiments

After two-and-a-half years of implementing these practices, we have completed several modules and developed a “[wish list](#)” of experiments for the next remixing of the research team. The project wish list serves as a guiding bibliography of tools, technologies, and DH subfields that engage digital manuscripts. Each item on the wish list implies multiple nested modules. We began, for example, with a goal of digitally representing the readers' notes in the manuscript. These annotations had been transcribed and analyzed by Emily Ulrich, as detailed in her article “[Echoes in the Margins: Reading the Dartmouth *Brut* in Early Modern England](#).” Since we were unable to include the transcriptions in the article, we posted them as an [online appendix](#) as a linear list.²⁵ Surely something more dynamic and revelatory would be possible with a born-digital interface? The answer of course is that *many* things are possible: choosing an approach is a research project in itself. We also learned that the word *annotation* caused confusion in every planning meeting due to widely variant (but all accurate) understandings of its meaning. For medievalists, it meant historical writing in the margins of the manuscript. For others, it meant contemporary writing about the manuscript. For still others, it meant digital marking of any kind (not just text) pinned to a digital image. Finally, for some, annotation implied interactive user-generated content (such as [Hypothes.is](#) for social reading). One person's raw data looked like another's completed analysis. The *Remix* annotation project, then, will have to begin with a study of these ambiguities before we can conceptualize new digital objects derived from the transcriptions of marginal writing in the manuscript. The ultimate goal will be several representations so that we can assess how different approaches affect conclusions about historical readers and contemporary technologies.

Our interest in annotation led us to explore transcription, another area of active development for digital medieval manuscript studies. Turning medieval handwriting into readable type is a complex task. Are digital transcription tools making it easier, faster, slower, or just different? How are developments in automatic transcription

and tagging affecting editorial theory? Tools like [T-Pen](#), [DigiPal](#), and [CATMA](#) are some of the resources ready for exploration. We started experiments in this area thanks to the participation of Qingyu Wang, at the time an MA student in Comparative Literature at Dartmouth who had studied Middle English paleography. For six months, Qingyu worked on “sampling” from around [folio 10v](#), which is densely annotated in the margins.²⁶ Jennifer Zhong, at the time a sophomore studying English and computer science, contributed to this module by expanding the bibliography of transcription tools. The goal was to compare the transcription process and outputs from several tools in order to assess interactions among text, annotation, and visual display. Jennifer and Qingyu completed their time with *Remix* before we developed a clear prototype. For now, we have archived their work and left transcription to the side, awaiting renewed interest from a future configuration of the team. This outcome illustrates well the modular methodology: we have a clear set of materials for continued work while, we hope, the students brought transferable research skills to their next endeavors.

While we have embraced the conceit that *Remix* could be about any manuscript, we do hope to contribute meaningful research on the *Brut* chronicle tradition. For example, we are interested in continuing the work begun with the [Imagining History Project](#), a descriptive catalogue that included most known copies of the *Brut* (but not ours).²⁷ As we were checking links for this article (November 5, 2017), we discovered that the long-orphaned wiki site is off-line (the last capture on the [Internet Archive Wayback Machine](#) was January 12, 2017). Is it strange to say we felt exhilarated by this development? During the [2016 Institute for Liberal Arts Digital Scholarship](#), Michelle and Laura, Dartmouth’s Digital Humanities librarian, thought about [how to approach a module on the catalogue](#) and learned [how to capture the web pages](#). We knew that the wiki was fragile and so secured permission from the lead investigator, John Thompson, to reuse the contents. As of this writing (January 30, 2018), our newest team member, Monica Erives (Digital Library Fellow at Dartmouth) has begun the work of [structuring the catalogue data](#). This module has become a “textbook case” for the study of digital infrastructure. The sudden disappearance of *Imagining History* from the live web illustrates the structural challenges of sustaining born-digital resources. We have several research questions to explore. What are our options for reformatting the basic records? How can we remix, revisualize, and remap them in newly meaningful ways? GIS (geographical information systems) platforms, for example, might be brought to bear on the ambitious

questions of cultural geography that were part of the original project vision. What happens if we run the same data through different mapping tools? Divya Kalidindi began to [explore mapping tools](#) with the *Brut* corpus during her time on the *Remix* team, and we hope to build on her module as *Re-Imagining History* comes together. We also envision further study of [archival interoperability](#) by identifying the corpus of digitized *Brut* manuscripts.²⁸

Digital imaging is another potential area of investigation. Since a digital manuscript is a collection of visual media files, pixels are mediating history and materiality in complex ways. Most dramatically, multispectral imaging can make invisible text visible or reveal patterns of color across vast numbers of image files.²⁹ What might we learn about image-based research through close reading of a much smaller set of images? Another approach might be something like Jesse Hurlbut's experiments with [manuscript averaging](#), where digital manipulation gives the impression of "looking through" a stack of semitransparent pages. The resulting image suggests new insights related to production, layout, and the quantification of space.³⁰ They also veer toward art, another important component of *Remix the Manuscript*. Digital art foregrounds the instability of image forms and colors, since software tools provide a myriad of ways to reconfigure any given file. How should we treat the pixel as meaningful historical unit? We are exploring the porous distinction between analysis and art through collaborations with a digital artist, [Benjamin Patrick](#). His work points to a meaningful convergence of digital medieval manuscript culture with creative arts and new media studies.³¹

Our first and never-ending experiment is our digital home—our website. From the beginning we have been "[thinking with themes](#)" and "[thinking with domains](#)," observing how each has shaped our imagination of what's possible.³² Some of these considerations may seem naive to experienced practitioners, but they are part of everyone's learning curve at some point: today's experts are yesterday's amateurs who dedicated their time to learning. We want to understand how any decision can be non-trivial. Our first undergraduate assistant, Logan Henderson, for example, chose a theme with a slider, which elegantly performs remixing for viewers. And because the theme has four headline boxes on the front page, we described the project with four headlines, which directly shaped our conception of method and mission. We soon discovered, though, that the institutional WordPress platform imposed some constraints on both collaboration and tool integration. These constraints continue to present real impediments to the project's growth. And we have some doubts

about the design's [accessibility](#). We have used the website “problem” itself as a case study of institutional infrastructure, digital preservation, and adaptive design. So far, we have more problems than solutions. We have, though, learned about data management from the specialist in our library, Barbara DeFelice. As a result, an ARK (Archival Record Key) has been assigned to each page of our website cited in this article—so that readers will still be able to find them if they move.³³ This act of infrastructural registration is one step toward conceptualizing a web page as a research object.

Case Study: Digital Publishing

One of the items on our early wish list was digital exhibitions. We wanted to see what we could learn by remixing material from an already published photo essay by Deborah Howe and Michelle Warren on the conservation process of the Dartmouth *Brut*.³⁴ Since we already had images and text (our dataset), we could focus the analysis on how different platforms reshaped the story and possibly also its arguments. Publishing the initial article had already demonstrated that the journal's policies for simultaneous publication in print, PDF, and HTML in fact tied all formats to print.³⁵ We imagined dynamic new freedoms with a born-digital exhibit.

This project appealed to Bay Lauris ByrneSim, a post-baccalaureate fellow at Dartmouth's Rauner Special Collections Library. Each fellow works on a year-long research project related to the collections. As an art history and history major interested in transnational networks of photomontage, Bay was curious to explore digital platforms centered on images. She committed to work on *Remix* for five hours per week for six months. This structure helped define the modular method that has become one of the central tenets of our research practice. Bay's goal was to collaborate with Deborah Howe to publish (at least) a publicly accessible photo archive and (at most) an expanded preservation story incorporating additional text and images. She also intended to test the impact of different publishing platforms. Even the most basic task, it turned out, required a village. Bay's project plunged us straight into the study of institutional infrastructure—making highly visible a number of functions essential to DH but which, as Laura Braunstein has argued, often remain invisible to scholars.³⁶

The photo essay had already been published in three formats by the journal *Digital Philology*, with the online versions hosted on the subscription-based Project Muse.³⁷ The author agreement, however, allows us to also host a version at our institution.

Technically, the first *remix* of the article is the [HTML web page](#). This format does not seem substantially different from the published essay. Both follow a linear presentation, with Deborah and Michelle's voices alternating as they describe their encounters with the manuscript from a conservation and academic point of view respectively. It is a true photo essay—Deborah and Michelle wrote from the images, and then assembled these thoughts into a narrative form.

For Bay's project, we wanted to use platforms that did not require installation or coding for three reasons: we were working with our team's capabilities, we wanted to be able to create a rapid prototype on each platform, and we sought to share insights useful to other DH projects that did not have significant funding for coders or programmers. Team member Jennifer Zhong put together a bibliography of well-known digital publishing tools, categorizing tools based on their production stage, limitations, and accessibility. After examining [Omeka](#) (in hosted and non-hosted instances), [Scalar](#), [DH Press](#), [Prospect](#), and [Twine](#), we settled on Scalar and [Omeka.net](#), the hosted instance of Omeka.

The first step was to gather the image files. This proved more challenging than expected, leading to a project in digital preservation. Bay discovered that the files for the images that had been published in *Digital Philology* had not been archived; they and many more documenting Deborah's conservation work resided only on a single computer in the conservation lab. Some of these files, moreover, contained the only surviving evidence of the model book that Deborah had created to investigate the physical conservation of the *Brut* manuscript as a book that could be opened regularly and used for different kinds of teaching. This turn of events is itself an interesting lesson in infrastructure: since the model book wasn't considered an archival object, it was not given a shelf number but instead placed on an open shelf in the conservation lab—and we can't reconstruct what happened to it. Nonetheless, all of us considered the model book a significant component of the manuscript research.

Thus, we faced a highly vulnerable collection of digital files—the hardware could malfunction, the metadata were changing each time a file was opened, and bits were slowly decomposing. The disintegration of digital files, colloquially known as “bit rot,” is widely acknowledged as a core challenge for the long-term preservation of digital objects.³⁸ Metadata changes, moreover, were effacing the records of provenance and other file properties each time a file was opened. Since we hoped to have more luck preserving the digital files than we had with the model book, we

took the case to Jenny Mullins, Dartmouth's digital preservation librarian. We made the case for the images' enduring historical value so that they could receive archival treatment as part of the library's digital collections. Jenny then "bagged" the files for long-term storage, preserving not only the files but also their associated metadata. Now we could work with derivatives of the original image files without fear of permanent corruption.

With the preservation issue addressed, Bay turned to access. Since we were focused on free, user-friendly platforms, we faced limitations in file size for uploaded (or hosted) media. And in some cases, platforms did not provide file hosting at all. Where could the digital files reside so that they could be accessed for digital exhibits? This problem caused our first deviation from our no-cost and no-coding premise. Increasingly, digitized medieval manuscripts use the International Image Interoperability Framework (IIIF), which stores digital files in a [sustainable infrastructure](#).³⁹ However, IIIF requires a (hosted) digital repository, which we didn't have at that time. We compromised by using [Shared Shelf](#), a subscription-based cataloging and (short-term) storage platform run by [ArtStor](#). Shared Shelf is commonly used by museums and libraries to store and publish digital avatars of objects in their collections. *Remix* became a case for testing the capabilities and limitations of Dartmouth's subscription to the service. To learn the platform's capabilities, Bay attended webinars run by ArtStor, but nonetheless questions inevitably arose that instructions did not cover. She then turned to Dartmouth's art librarian and Shared Shelf administrator, Laura Graveline, and the ArtStor staff. Bay catalogued the images with Deborah's help, worked through metadata questions, and ultimately published the images via Shared Shelf Commons as "[Dartmouth College: Remix the Manuscript](#)."⁴⁰ The entire process involved input from a wide network of library colleagues and Shared Shelf consultants.

This network made apparent the foundational and essential role of infrastructure in enabling the day-to-day work of digital research. *Remix* drew in a number of functional specialists—that is, library professionals whose focus is not a particular disciplinary field such as English literature or psychology but rather a function like digital preservation. Indeed, Dartmouth currently has a Digital Humanities librarian, a digital preservationist, a digital archivist, a digital scholarship librarian, a data visualization librarian, and a team of cross-disciplinary data management specialists. These specialists work in many different departments throughout the library, yet their work is often opaque to faculty, even to those working in DH. In this way, library collaboration is part of the wider tension in DH around labor, credit, and compensation.⁴¹

Final products receive praise according to cultural practices modeled on the scholarly monograph, while the intellectual impacts of project consultation, development, and maintenance are less often highlighted. The landscape of professional credit has changed little since Miriam Posner outlined the frustrations for librarians (particularly those without faculty status) involved in DH projects.⁴² From a certain perspective, *Remix* became a project-based “skunkworks,” a term that Bethany Nowviskie, borrowing from the history of aeronautics R&D, uses to describe “semi-independent research-and-development labs staffed with librarians who act as scholar-practitioners.”⁴³ *Remix* endeavors to integrate and acknowledge the critical contributions of the many experts who are regularly part of the mix.

The challenges of preserving and then finding a semi-sustainable home for the images consumed much of Bay’s time. With only a short time remaining, she began work on a digital exhibit, RemixTheManuscript.Omeka.net.⁴⁴ Omeka interoperates easily with Shared Shelf via a plug-in, so the images appeared smoothly in the “collections” part of Omeka with all the associated metadata. However, the platform’s architecture structured our dataset in an entirely novel way. As Quinn Dombrowski explains in *Drupal for Humanists*, Omeka is a good platform “if you can meaningfully organize the data into exhibit-like collections.”⁴⁵ Omeka forces data into discrete groups (collections, exhibitions, pages, blocks) that are arranged in a nesting manner. In the photo essay, Deborah and Michelle’s voices alternate as they move through a semi-chronological narrative of the *Brut* at Dartmouth. To create an Omeka exhibition, Bay had to break the text into pages, with each page containing several blocks; each block is either “text,” “file with text,” or “gallery.” She grouped the paragraphs and images by theme while preserving the text’s basic chronology, but then she had to create page titles (not present in the paper, PDF, or HTML versions) so users could navigate between the different pages. Omeka’s infrastructure fractured the essay, creating new divisions and fostering a vastly different experience. The HTML format provides a linear experience through scrolling, while the PDF and paper version provide pages that do not necessarily correlate to topics or themes. The open print book, moreover, structures visual juxtapositions that don’t operate in any of the digital forms.

On Omeka, users can navigate the exhibition in a nonlinear fashion by clicking the different page titles in the sidebar. But linearity is reinforced by the arrows at the bottom of each page that direct the reader to move forward/right to the next page or backward/left to the previous page. The free hosted version of Omeka also only has four themes; the themes change the aesthetics of the Omeka site

but do not fundamentally alter its main components (collections, exhibitions, featured items). In Omeka, the architecture of the platform dictates everything from content decisions to aesthetic choices as users trade ease for lack of flexibility. The experiment with Omeka.net was a microcosm of the larger issues that *Remix* addresses, about how platforms not only shape the presentation of knowledge but also how knowledge itself is generated.

As an alternative to the linearity of HTML and the segmentation of Omeka, we tried [Scalar](#), a “free, [open source](#) authoring and publishing platform that’s designed to make it easy for authors to write long-form, born-digital scholarship online,” that “take[s] advantage of the unique capabilities of digital writing, including nested, recursive, and non-linear formats.”⁴⁶ Michelle and Deborah spoke to the photographs as individual items, but the paper, PDF, HTML, and Omeka versions all fostered the creation of a discrete (and chronological) narrative. We thought Scalar would foreground the images and allow users to direct their own experiences.

The implementation proved more time-consuming than Bay had anticipated. With her role on the team coming to a close, she completed a partial prototype, “[The Dartmouth Brut: Conservation, Authenticity, Dissemination](#).”⁴⁷ The experience revealed that, like Omeka, the need for page titles would restructure the thematic messaging. Bay’s experiments were cut short, however, while she resolved display issues related to interoperability. Scalar, like the free version of Omeka, has limited hosting space and is described as capable of “pointing to” any type of digital object, from YouTube videos to digitized PDFs. The digital object becomes its own page, but it can also be embedded in a page. Some time was spent figuring out how to use images stored in Shared Shelf, which is designed to operate smoothly within its own environment but not intended for robust interoperability with other platforms. Clearly, an interoperable image repository remains necessary for sustained experimentation. In the future, we can imagine using Scalar’s annotation feature to connect specialized vocabulary to its visual representation (such as a tacket on a binding) or to annotate the annotations of the chronicle text. For now, though, we have archived the publishing module, as it doesn’t align with the goals of the current team. Nonetheless, we continue to draw on the insights gained into interoperability as well as the boundaries between archive and narrative.

Conclusion

Remix the Manuscript is just getting started. Even though our

portfolio is still small, it suggests some of contributions these experiments can make. The methodology is broadly consistent with what James Smithies has called a “postfoundational” approach to DH: “engagement with a process of continuous methodological and, yes, theoretical refinement that produces research outputs as snapshots of an ongoing activity rather than the culmination of ‘completed’ research.”⁴⁸ The *Brut* chronicle itself neatly reflects this approach: it contains an ongoing, not always continuous, narrative of events and detours. The digital *Brut* amplifies these effects by reminding us that machining is also handcrafting: just as we have come to understand the authoring roles of scribes, we can also account for the authoring dimensions of digitization. Digital manuscripts are thus new material objects that already have histories and whose futures we are only beginning to understand. They represent a significant corpus distinct from the body of materials created in the historical centuries we call medieval. *Remix* thus takes philology deeper into the digital zone—not in terms of textual editing or repository building (both well-established activities)—but in terms of treating media files and software as sources that call for their own distinctive philology.

Digital manuscript studies can also change the way we think about the relationship between print culture and the digital humanities. Todd Presner, for example, has framed DH almost entirely as an overcoming of print: “What happens when print is no longer the normative or exclusive medium for producing literature and undertaking literary studies?”⁴⁹ By contrast, Laura Mandell has embedded the future of DH in a deeper engagement with printed books.⁵⁰ Digital avatars of medieval manuscripts resolve the tension between these two approaches. Medieval manuscripts clearly stand apart from print (and thus from the norming that Presner evokes) while their study in the modern era has been thoroughly mediated by print (thus partaking of the ethos identified by Mandell). As products of a culture of imaging (where the technology of reproduction was hand copying) now subject to imaging (via scanner and camera), digitized manuscripts disrupt the teleology of media and complicate digital epistemologies. They show that the binary framing of material history (print versus digital) is inadequate for the materials of world heritage. While *Remix the Manuscript* cannot repair this inadequacy on its own, our experiments can expand the discussion on how methods for investigating, representing, and disseminating materials from the past are entangled with their prospects for meaningful futures.

Remix seeks to bring medieval studies into dialogue with critical making, a burgeoning area of research in DH.⁵¹ *Making* foregrounds process as much as product, giving weight to the

experimental and the speculative. In a critical mode, it exposes the work of form and mediation. Making, or *fabrica*, is a step beyond Johanna Drucker's influential distinction between data (things given) and capta (things taken): things that have to be *made* do not yet exist for the taking.⁵² In this spirit, we embrace the recursive implications of Ian Bogost's notion of philosophical carpentry, which "entails making things that explain how things make their world."⁵³ Even before we began *Remix*, Deborah Howe was modeling her theory of the manuscript by fabricating paper and leather. This speculative object gained a broader audience thanks to the digital manuscript; both contributed to the current form of MS 003183. Making, then, conjoins the medieval and the digital, the past and present. As Galey has remarked, "Even as we design new digital artefacts, we are still learning how books work, as well as manuscripts and other textual materials."⁵⁴ *Making* is at once a digital practice, a material mode of thinking, and a Middle English word for writing poetry. This confluence renders *making* historically consistent with both the *Brut* chronicle manuscript and its digital avatar.

Finally, as stated at the outset, *Remix* is part of the deepening dialogue between DH and critical infrastructure studies. When we use several similar tools to engage one set of data, we can assess the hermeneutic work of tools and platforms while also exposing the interpretative processes that lie within the data themselves. This methodology goes beyond what Presner has called "comparative data studies" to comparative epistemology.⁵⁵ Through comparison, we can highlight zones of convergence (information stability) and critical vectors of divergence (unique features made visible or invisible in particular environments). When we look closely at knowledge infrastructure, our ways of knowing are themselves exposed as products of discrete circumstances. By increasing awareness of how those circumstances generate the products they do, we also increase awareness of the many factors that mediate the historical record. Similar questions have driven the work of many scholars—in gender studies, critical race theory, and media studies—who examine how infrastructure encodes politics, identity, and culture.⁵⁶ In this approach, certain "failures" are not failures at all but meaningful data points that expose the usually hidden work of infrastructure. Our favorite recent failure occurred as we were working on final edits for this article in a shared Google Doc: Bay and Laura found their access terminated when an algorithm deemed the file "inappropriate for sharing." While this situation became [funny once we hacked around the disruption](#), the moment revealed the fragility of our collaboration infrastructure and our

exposure to automated judgments that in other contexts have far more sinister effects.⁵⁷ Even in the seemingly benign world of medieval manuscript studies, the disturbance serves as a pointed reminder that the complex systems tasked with mediating the future may rewrite the past in the blink of a pixel.

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1. Michelle R. Warren et al., *Remix the Manuscript: A Chronicle of Digital Experiments* (blog), <http://n2t.net/ark:/44461/r4gw8k>. []
2. Mora Nolan, "Medieval Habit, Modern Sensation: Reading Manuscripts in the Digital Age," *The Chaucer Review* 46 (2013): 465-76; Elaine Treharne, "Fleshing out the Text: The Transcendent Manuscript in the Digital Age," *postmedieval* 4, no. 4 (2013): 465-78, <http://doi.org/10.1057/pmed.2013.36>. []
3. Sheila Anderson, "What Are Research Infrastructures?" *International Journal of Humanities and Arts Computing* 7, no. 1-2 (2013): 4-23, at 9-11, <https://doi.org/10.3366/ijhac.2013.0078>; Lisa Parks and Nicole Starosielski, eds., *Signal Traffic: Critical Studies of Media Infrastructures* (Urbana: University of Illinois Press, 2015); Deb Verhoeven, "As Luck Would Have It: Serendipity and Solace in Digital Research Infrastructure," *Feminist Media Histories* 2, no. 1 (2016): 7-28, especially 13-18, <http://fmh.ucpress.edu/content/2/1/7>; Alan Liu, "Drafts for *Against the Cultural Singularity* (book in progress)" *Alan Liu* (blog), May 2, 2016, <http://liu.english.ucsb.edu/drafts-for-against-the-cultural-singularity/>; Roopika Risam, Justin Snow, and Susan Edwards, "Building an Ethical Digital Humanities Community: Librarian, Faculty, and Student Collaboration," *College & Undergraduate Libraries* 24, no. 2-4 (2017): 1-13, <https://doi.org/10.1080/10691316.2017.1337530>. []
4. Michelle R. Warren, "Philology in Ruins." *Florilegium* 32 (2015): 59-76; "Shimmering Philology," *postmedieval* 5, no. 4 (2014): 389-97; "The Politics of Textual Scholarship," *The Cambridge Companion to Textual Scholarship*, eds. Neil Fraistat and Julia Flanders (Cambridge: Cambridge University Press, 2013), 119-33. []
5. Siân Echard, "The Ghost in the Machine: Digital Avatars of Medieval Manuscripts," *Printing the Middle Ages* (Philadelphia: University of Pennsylvania Press, 2008), 198-216; Elaine Treharne, "Fleshing Out the Text: The Transcendent Manuscript in the Digital Age," *postmedieval* 4, no. 4 (2013): 465-78. []
6. Ségolène Tarte, "Digital Images of Ancient Textual Artefacts: Connecting Computational Processing and Cognitive Processes," *Dagstuhl Reports* 4, no. 7 (2014): 130-31, at 130, <http://doi.org/10.4230/DagRep.4.7.112>; Sarah Werner gives a succinct illustration of the representational uncertainties that characterize digital images: *Book History Questions and Digital Facsimiles*, "Wynken de Worde" (blog), September 29, 2017, <http://sarahwerner.net/blog/2017/09/book-history-questions-and-digital-facsimiles/>. []

7. Ségolène Tarte, “Interpreting Ancient Documents: Of Avatars, Uncertainty, and Knowledge Creation,” presentation at Exploratory Workshop on Digital Paleography (July 22, 2011), https://www.academia.edu/1693690/Interpreting_Ancient_Documents_Of_Avatars_Uncertainty_and_Knowledge_Creation; Tarte explains further the sources of these concepts in “‘Šalmu’ and the Nature of Digitized Artefacts,” *From Artefact to Meaning* (blog), June 5, 2011, <https://charades.hypotheses.org/114>. []
8. Lister Matheson, *The Prose Brut: The Development of a Middle English Chronicle* (Tempe: Medieval & Renaissance Texts & Studies, 1998), <https://archive.org/details/prosebrutdevelop00mathuoft>. []
9. Elizabeth Bryan, “Rauner Codex MS 003183: The Beeleigh Abbey *Brut* at Dartmouth College,” *Journal of the Early Book Society* 12 (2009): 207–43. []
10. Emily Ulrich, “Echoes in the Margins: Reading the Dartmouth *Brut* in Early Modern England,” *Digital Philology* 3, no. 2 (2014): 284–303, <http://doi.org/10.1353/dph.2014.0013>; Julia Marvin, “‘It is to harde for my lernyng’: Making Sense of Annotations in Brut Manuscripts,” *Digital Philology* 3, no. 2 (2014): 304–22, <http://doi.org/10.1353/dph.2014.0015>. []
11. Dartmouth *Brut*, MS 003183, Rauner Special Collections Library, Dartmouth College, Hanover, <http://doi.org/10.1349/ddlp.604>. []
12. Michelle R. Warren, “Situating Digital Archives,” *Digital Philology* 3, no. 2 (2014): 169–77, <http://doi.org/10.1353/dph.2014.0014>. []
13. William Marx and Raluca Radulescu, eds., *Readers and Writers of the Prose Brut*, special issue of *Trivium* 36 (2006); Jaclyn Rajsic, Erik Kooper, and Dominique Hoche, eds., *The Prose Brut and Other Late Medieval Chronicles: Books Have Their Histories* (York: York Medieval Press, 2016). []
14. David J. Birnbaum, Sheila Bonde, and Mike Kestemont, eds., *The Digital Middle Ages*, a special supplement, *Speculum* 92, no. S1 (2017), <https://www.journals.uchicago.edu/toc/spc/2017/92/S1>. []
15. Alan Galey and Stan Ruecker, “How a Prototype Argues,” *Literary and Linguistic Computing* 24, no. 5 (2010): 405–24, at 405, <https://doi.org/10.1093/lc/fqq021>. []
16. Galey and Ruecker, “How a Prototype Argues,” 421. []
17. Galey and Ruecker, “How a Prototype Argues,” 407; Bernard Cerquiglini, *In Praise of the Variant: A Critical History of Philology*, trans. Betsy Wing (Baltimore: The Johns Hopkins University Press, 1999), 79. []
18. Whitney Trettien, “Remixing History,” *remixthebook* (blog), January 9, 2012, <http://www.remixthebook.com/by-whitney-trettien>. []
19. “Mix,” *Middle English Dictionary*, <http://quod.lib.umich.edu/cgi/m/mec/med-idx?type=id&id=MED28382>. []
20. Deborah Howe and Michelle R. Warren, “The Dartmouth *Brut*: Conservation, Authenticity, Dissemination,” *Digital Philology* 3, no. 2 (2014): 178–95, at 192, <http://doi.org/10.1353/dph.2014.0016>. []
21. “Mix,” *Oxford English Dictionary Online*,

- <http://www.oed.com> (subscription). []
22. Josh Honn, "Never Neutral: Critical Approaches to Digital Tools and Culture in the Humanities," Digital Humanities Speaker Series, University of Western Ontario, September 11, 2013, https://arch.library.northwestern.edu/concern/generic_works/q524jn78d. []
23. Roopika Risam, "Digital Humanities in Other Contexts" *Roopika Risam* (blog), May 3, 2016, <http://roopikarisam.com/uncategorized/digital-humanities-in-other-contexts/>. []
24. Katrina Anderson, Lindsey Bannister, Janey Dodd, Deanna Fong, Michelle Levy, and Lindsey Seatter, "Student Labour and Training in Digital Humanities," *Digital Humanities Quarterly* 10, no. 1 (2016), <http://www.digitalhumanities.org/dhq/vol/10/1/000233/000233.html>. []
25. Ulrich, "Echoes in the Margins," with online appendix, <https://doi.org/10.1349/ddlp.604>. []
26. *Dartmouth Brut: Digital Version*, Dartmouth Digital Collections, f. 10v, <https://doi.org/10.1349/ddlp.604.p22>. []
27. John Thompson, Stephen Kelly, Ryan Perry, and Jason O'Rourke, *The Imagining History Project*, Queen's University Belfast (2002-05), https://web.archive.org/web/20170112164240/http://www.qub.ac.uk/imagining-history/resources/wiki/index.php/Main_Page. []
28. Example described by Benjamin Albritton, "Fellow Travelers: The Canterbury Tales and IIIF," *Digital Manuscripts at Stanford* (blog), July 14, 2015, <http://web.stanford.edu/group/dmstech/cgi-bin/wordpress/fellow-travelers-the-canterbury-theses-and-iiif/>. []
29. E.g., Reviel Nietz, William Noel, Nigel Wilson, and Natalie Tchernetska, eds, *The Archimedes Palimpsest* (Cambridge; Cambridge University Press, 2011); Maidie Hilmo, "Did the Scribe Draw the Miniatures in British Library, MS Cotton Nero A.x (The Pearl-Gawain Manuscript)?" *Journal of the Early Book Society* 20 (2017): 111-36; *Digitally Enabled Scholarship with Medieval Manuscripts* (Yale University), where *Remix* team member Emily Ulrich has been a research assistant, <https://desmm.yale.edu/>. []
30. Jesse Hurlbut, "The Manuscript Average," *Manuscript Art: Taking a Closer Look* (blog), December 15, 2013, http://jessehurlbut.net/wp/mssart/?page_id=2097. []
31. Warren, "Philology in Ruins," 72-73. []
32. Warren, "Thinking with Themes," *Remix the Manuscript* (blog), September 2, 2015, <http://n2t.net/ark:/44461/r43q0d>; "Thinking with Domains," *Remix the Manuscript* (blog), October 6, 2015, <http://n2t.net/ark:/44461/r40088>. []
33. Through the Dartmouth Library's subscription to [EZID](#), we received a Name Assigning Authority Number (NAAN) and have been freely minting ARKs as needed. []
34. Howe and Warren, "The Dartmouth Brut." []
35. Warren, "Situating Digital Archives." []
36. Laura Braunstein, "Open Stacks: Making DH Labor Visible,"

- dh+lib (website), posted June 7, 2017,
<http://acrl.ala.org/dh/2017/06/07/open-stacks-making-dh-labor-visible/>. []
37. Howe and Warren, "The Dartmouth *Brut*." []
38. Vint Cerf, "Avoiding 'Bit Rot': Long-Term Preservation of Digital Information," *Proceedings of the IEEE* 99, no. 6 (2011): 915-16, <https://doi.org/10.1109/JPROC.2011.2124190>; Sally Vermaaten, Brian Lavoie, and Priscilla Caplan, "Identifying Threats to Successful Digital Preservation: The SPOT Model for Risk Assessment," *D-Lib Magazine* (2012), <https://doi.org/10.1045/september2012-vermaaten>; Trevor Owens, *The Theory and Craft of Digital Preservation*. (Baltimore: The Johns Hopkins University Press, forthcoming); preprint accessed 30 October 2017, <https://doi.org/10.17605/OSF.IO/5CPJT>. []
39. Lukas Rosenthaler and Peter Fornaro, "The 'International Image Interoperability Framework' and its Implication to Preservation," *Archiving Conference Proceedings*, Society for Imaging Science and Technology (2016): 95-99, <https://doi.org/10.2352/issn.2168-3204.2016.1.0.95>; Sheila Rabun, "Building Community Around the International Image Interoperability Framework (IIIF)," Council on Library and Information Resources (website), posted January 27 2017, <http://connect.clir.org/blogs/sheila-rabun/2017/01/27/iiif>. []
40. Bay Lauris ByrnSim and Debroah Howe, "Dartmouth College: Remix the Manuscript," Shared Shelf Commons, Artstor, <http://www.sscommons.org/openlibrary/welcome.html#3|collections|7731004||Dartmouth3A20Remix20the20Manuscript||>. []
41. Particularly regarding student labor; see Spencer D. Keralis, "Disrupting Student Labor in the Digital Humanities Classroom" (lecture, Rice University, March 11, 2016) <https://researchanddestroy.net/2016/03/18/disrupting-student-labor-in-the-digital-humanities-classroom/>. []
42. Miriam Posner, "No Half Measures: Overcoming Common Challenges to Doing Digital Humanities in the Library" *Journal of Library Administration* 53, no. 1 (2013), <http://www.tandfonline.com/doi/full/10.1080/01930826.2013.756694?scroll=top&needAccess=true>. []
43. Bethany Nowviskie, "Skunks in the Library: A Path to Production for Scholarly R&D" *Journal of Library Administration* 53, no. 1 (2013), <http://www.tandfonline.com/doi/full/10.1080/01930826.2013.756698?src=recsys>. []
44. Bay Lauris ByrneSim, Deborah Howe, and Michelle R. Warren, "Remix The Manuscript," on *Omeka*, <http://n2t.net/ark:/44461/r4kq0r>. []
45. Quinn Dombrowski. "Drupal Compared to Omeka," Drupal for Humanists (website), updated February 22, 2018, <http://drupal.forhumanists.org/drupal-humanists-chapter-1-first-things/drupal-compared-omeka>. []
46. "Welcome," *Scalar 2 User's Guide*, version 14 (September 15, 2017), <http://scalar.usc.edu/works/guide2/index>. []
47. Bay Lauris ByrneSim, Deborah Howe, and Michelle R. Warren, "The Dartmouth *Brut*: Conservation, Authenticity,

- Dissemination,” *Scalar*, 2016,
<http://n2t.net/ark:/44461/r4g08m>. []
48. James Smithies, “*Digital Humanities, Postfoundationalism, Postindustrial Culture*,” *Digital Humanities Quarterly* 8, no. 1 (2014),
<http://www.digitalhumanities.org/dhq/vol/8/1/000172/000172.html>.
[]
49. Todd Presner, “Comparative Literature in the Age of Digital Humanities: On Possible Futures for a Discipline,” *A Companion to Comparative Literature*, eds. Ali Behdad and Dominic Thomas (West Sussex, UK: Wiley-Blackwell, 2011), 193-207, at 195. []
50. Laura Mandell, *Breaking the Book: Print Humanities in the Digital Age* (West Sussex, UK: Wiley-Blackwell, 2015). []
51. Jentery Sayers, ed., *Making Things and Drawing Boundaries: Experiments in the Digital Humanities* (Minneapolis: University of Minnesota Press, 2017). []
52. Johanna Drucker, “Humanities Approaches to Graphical Display,” *Digital Humanities Quarterly* 5, no. 1 (2011),
<http://www.digitalhumanities.org/dhq/vol/5/1/000091/000091.html>;
Jentery Sayers, “Why Fabricate?” *Scholarly and Research Communication* 6, no. 3 (2015), <http://src-online.ca/index.php/src/article/view/209/428>. []
53. Ian Bogost, *Alien Phenomenology, or, What It's Like to Be a Thing* (Minneapolis: University of Minnesota Press, 2012), 93. []
54. Alan Galey, “The Human Presence in Digital Artifacts,” in *Text and Genre in Reconstruction: Effects of Digitalization on Ideas, Behaviours, Products, and Institutions*, ed. Willard McCarty (Oxford: Open Book, 2010), 93-117, at 116. []
55. Presner, “Comparative Literature in the Age of Digital Humanities,” 201-2. []
56. Wendy Chun, *Programmed Visions: Software and Memory* (Cambridge, MA: MIT Press, 2011); Lisa Nakamura and Peter Chow-White, eds., *Race After the Internet* (New York: Routledge, 2011); Dorothy Kim and Jesse Stommel, eds., *Disrupting the Digital Humanities* (Brooklyn: Punctum Books, forthcoming 2018). []
57. E.g., Safiya Noble, *Algorithms of Oppression: How Search Engines Reinforce Racism* (New York: New York University Press, 2018). []

FOOTNOTES

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